Gulf Cooperation Council

EDICT OF GOVERNMENT

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GSO ISO 2942 (2011) (English): Hydraulic fluid power – Filter elements – Verification of fabrication integrity and determination of the first bubble point

ISO INSIDE

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هيئة التقييس لدول مجلس التعاون لدول الخليج العربية
GCC STANDARDIZATION ORGANIZATION (GSO)

مشروع : نهائي

GSO2/FDS/ ISO 2942:2011
ISO 2942:2004

قدرة السوائل الهيدرولية- عناصر المرشح – التحقق من سلامة التصنيع وتحديد النقطة الأولى لتكون الفقاقيع

Hydraulic fluid power – Filter elements – Verification of fabrication integrity and determination of the first bubble point

إعداد

اللجنة الفنية الخليجية الفرعية لقطاع مواصفات المركبات والإطارات

هذه الوثيقة مشروع لمواصفة قياسية خليجية تم توزيعها لإبداء الرأي والملاحظات بشأنها، لذلك فإنها عرضة للتغيير والتبديل، ولا يجوز الرجوع إليها كمواصفة قياسية خليجية إلا بعد اعتمادها من مجلس إدارة الهيئة الخليجية.

تقديم

هيئة التقييس لدول مجلس التعاون لدول الخليج العربية هيئة إقليمية تضم في عضويتها الأجهزة الوطنية للمواصفات والمقاييس في دول الخليج العربية ، ومن مهام الهيئة إعداد المواصفات القياسية الخليجية بواسطة لجان فنية متخصصة .

وقد قامت هيئة التقييس لدول مجلس التعاون لدول الخليج العربية ضمن برنامج عمل اللجنة الفنية رقم ٢-١ " اللجنة الفنية الخليجية الفرعية لقطاع مواصفات المركبات والإطارات " بتبني المواصفة القياسية الدولية رقم آيزو ٢٠٠٤/٢٩٤٢ " قدرة السوائل الهيدرولية- عناصر المرشح – التحقق من سلامة التصنيع وتحديد النقطة الأولى لتكون الفقاقيع " – والتي أصدرتها "المنظمة الدولية للتقييس" وتمت ترجمتها باللغة العربية ، وقامت المملكة العربية السعودية بإعداد مشروع هذه المواصفة.

وقد اعتمدت هذه المواصفة كمواصفة قياسية خليجية دون إدخال أية تعديلات فنية عليها وذلك في اجتماع مجلس إدارة الهيئة رقم ( ) ، الذي عقد بتاريخ / / هـ ، الموافق / / م.

Foreword

GCC Standardization Organization (GSO) is a regional Organization which consists of the National Standards Bodies of GCC member States. One of GSO main functions is to issue Gulf Standards through specialized technical committees (TCs).

GSO through the technical program of committee TC No.2-1: " The Gulf technical Subcommittee for vehicles an d tyres st andards" has adopt ed the International Standard No. : ISO 2942:2004 "Hydrau lic fluid power – Filter elements – Verification of fabri cation integrity and determination of the first bubble point " issued by International Organization for Standardization which has been t ranslated into Arabic. The Dr aft Standard has been prepared by Kingdom of Saudi Arabia

This standard has been approved as Gulf Standard without any technical modifications by GSO Board of Directors in its meeting No..../.... …….held on / / / H , / / G

INTERNATIONAL STANDARD

ISO 2942

Fourth edition
2004-08-15

Hydraulic fluid power — Filter elements — Verification of fabrication integrity and determination of the first bubble point

Transmissions hydrauliques — Éléments filtrants — Vérification de la conformité de fabrication et détermination du point de première bulle

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2942 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 6, *Contamination control*.

This fourth edition cancels and replaces the third edition (ISO 2942:1994) which has been technically revised.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Filters maintain fluid cleanliness by removing insoluble contaminants.

The ability of a filter to achieve and maintain the required level of performance depends, among other parameters, upon its filtration rating and structural integrity. Any imperfections in the structure, either through poor manufacturing techniques or lack of strength, will allow bypassing of unfiltered fluid.

The integrity of the element after manufacture can be evaluated using a non-destructive filter integrity test. This test determines whether flaws are present which would allow the fluid to bypass the filtering process and provides for quality control. The test is also used to evaluate whether damage has been sustained by the element during both service and laboratory tests.

The first bubble point test is used for investigative product development and/or production process evaluation. The acceptability of filtration performance cannot be determined by the first bubble point test.

Hydraulic fluid power — Filter elements — Verification of fabrication integrity and determination of the first bubble point

1 Scope

This International Standard specifies a bubble-point test method applicable to filter elements used in hydraulic fluid power systems. It can be used either to verify the fabrication integrity of a filter element (by checking the absence of bubbles) or to permit the localization of the largest pore of the filter element by determining the first bubble point.

Verification of fabrication integrity defines the acceptability of the filter elements for further use or testing.

The first bubble point is established through continuation of the fabrication integrity test. It is under no circumstances a functional characteristic of a filter element; in particular, it cannot be used for extrapolation to the concepts of filtration rating, efficiency or retention capacity and should be used for information only.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 6295, *Petroleum products — Mineral oils — Determination of interfacial tension of oil against water — Ring method.*

3 Terms and definitions

For the purposes of this International Standard, the definitions given in ISO 5598 and the following apply.

3.1
filter element
porous device that performs the actual process of filtration

NOTE This definition differs from that given in ISO 5598, which reads: “The component which ensures the retention of contaminant.”

3.2
fabrication integrity
physical acceptability of a filter element to meet the specification designated by the filter manufacturer

3.3
first bubble point
pressure at which the first bubble stream appears when a filter element is tested using the method specified in this International Standard

NOTE In the absence of manufacturing defects, this value is indicative of the largest pore of the filtering medium.

4 Apparatus and materials

4.1 Bubble-point testing apparatus, as shown in Figure 1, is comprised of the elements 4.1.1 to 4.1.5:

4.1.1 Compressed-air supply, with filter(s) and pressure regulator(s), adjustable up to 10 kPa (100 mbar).

4.1.2 Pressure-measuring device, with an accuracy of ± 5 % of the reading.

4.1.3 Temperature-measuring device, with an accuracy of ± 0,5 °C.

4.1.4 Test container, for submerging the filter element under test.

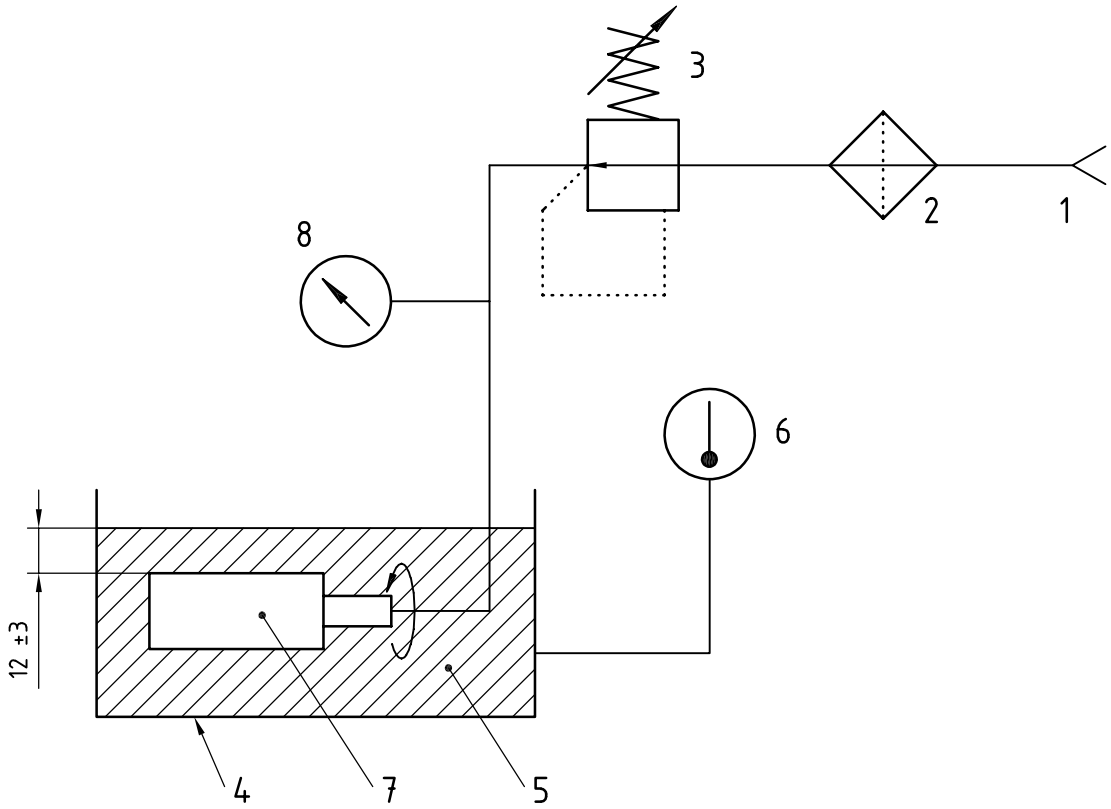
4.1.5 Device, for restraining the filter element during immersion to the required depth and allowing rotation about the element's major axis either manually or with an automatic mechanism.

4.2 Test liquid

The test liquid shall be clean propan-2-ol (isopropyl alcohol or IPA) or an alternative liquid designated by the filter element manufacturer. Its cleanliness shall be consistent with subsequent test requirements. Its surface tension shall be regularly checked in accordance with the requirements of ISO 6295. It is advisable to renew the liquid when its surface tension varies by ± 15 % from the original value.

If the test element has been exposed to other hydraulic fluids prior to being subjected to the fabrication integrity test, then it is permissible to use the same type of hydraulic fluid as the fabrication integrity test liquid, provided that the requirements of 4.2 are met. If this is not possible, all residual previous liquid shall be removed by appropriate means before testing. This is to ensure correct and consistent wetting of the element's media. Test data can be compared only between tests that have used the same type of test liquid at equal testing conditions.

Dimensions in millimetres



Key

1 compressed air supply
2 compressed air filter
3 pressure regulator
4 test container
5 test liquid
6 thermometer
7 filter element under test
8 pressure-measuring device

Figure 1 — Typical bubble-point testing apparatus

5 Test methods

WARNING — Exercise care when using solvents with low flash points, as there could be a risk of fire or explosion. Appropriate precautions should be taken to avoid inhalation of fumes from these solvents. Always use suitable protective equipment. Attention is drawn to local health and safety procedures.

5.1 General procedure

5.1.1 Check that the manufacturer's identification number or part number of the filter element to be tested complies with the manufacturer's specification.

5.1.2 Install the clean filter element in the bubble-point testing apparatus (see 4.1), with the major axis of the filter element parallel to the surface of the test liquid (see 4.2).

5.1.3 Submerge the filter element in the test liquid, which shall be at a temperature of (22 ± 5) °C.

5.1.4 Allow the filter element to remain submerged in the test liquid for 5 min before proceeding, to ensure that the filter element media fibres are wetted. The filter element may be soaked in the test container (4.1.4) prior to its being secured in the restraining device (4.1.5). If soaking is carried out while the filter element is secured in the restraining device, ensure that no pressure is applied to the filter during the soaking period.

5.1.5 Ensure that the lines connecting the pressure-measuring device (4.1.2) to the rest of the apparatus are void of liquid.

5.2 Verification of fabrication integrity (absence of air bubbles)

5.2.1 Apply just enough air pressure to the inside of the filter element to clear any lines of test liquid and to pressurize the element. If necessary, readjust the depth of the test liquid covering the element to (12 ± 3) mm above the top of the filter media.

5.2.2 After the pressure stabilizes, rotate the element around its major axis and gradually increase the pressure in a minimum of four suitable increments [for example, 100 Pa (1 mbar)]. Allow the element at least one rotation of 360° at each increment while checking for evidence of bubbles. Continue increasing the pressure until the value designated by the filter manufacturer is reached.

NOTE Air bubbles might be trapped on or within the outer structure of the filter element, resulting in a few spurious bubbles. These bubbles can be ignored. A steady stream of bubbles from the filter element at or below the manufacturer's designated pressure is the only consideration.

Adequate lighting is required for reliable observation.

Increase air pressure slowly to allow equilibrium to be established and to prevent overshooting of pressure. Avoid mechanical vibration or jarring of the test element to prevent upsetting bubble equilibrium, which will give an erroneous and an unrepresentative first bubble-point value. The speed at which the filter element is rotated should be controlled so as not to disturb or release air from the element.

Adjust the depth of the test liquid covering the filter element to (12 ±3) mm above the top of the filter media throughout the test.

5.2.3 Record the temperature of the test liquid.

5.2.4 The acceptance criterion is that there shall be no evidence of a single continuous stream of bubbles at or below the pressure specified by the manufacturer. Record the acceptance or failure of the filter element in accordance with the requirements of Annex A.

5.3 Determination of the first bubble point

5.3.1 Gradually apply air pressure progressively to the inside of the filter element in accordance with 5.2.1, while rotating it about its axis in accordance with 5.2.2. Increase the pressure in suitable increments, beginning at zero pressure or, if this test is a continuation of the fabrication integrity test, at the pressure reached in 5.2.2.

Stop the pressure rise as soon as a single continuous stream of bubbles appears. Record the corresponding pressure (this is the first bubble point), the test liquid temperature and the location of the bubbles.

NOTE Air bubbles might be trapped on or within the outer structure of the filter element, resulting in a few spurious bubbles. These bubbles can be ignored.

Avoid mechanical vibration or jarring of the test element to prevent upsetting the bubble equilibrium, which causes erroneously low pressure readings.

5.3.2 Completely release the air pressure in the filter element to allow the filter-element medium to be thoroughly wetted with liquid, repeat the procedures given in 5.3.1 an additional two times (to give a total of three times), and record the corresponding pressures and locations.

NOTE When applying the pressure the second and third times, it is permitted to increase the pressure from 0 % to 50 % of the pressure measured in 5.3.1 rapidly and without respecting the suitable increments.

6 Data presentation

Record the result of the verification of fabrication integrity and the data for the determination of the first bubble point in accordance with the typical test report shown in Annex A.

7 **Identification statement** (Reference to this International Standard)

It is highly recommended that manufacturers who elect to comply with this International Standard use the following conformance statement in test reports, catalogues and sales literature:

“Filter element fabrication integrity verified and/or first bubble point determined in accordance with ISO 2942:2004, *Hydraulic fluid power — Filter elements — Verification of fabrication integrity and determination of the first bubble point*”.

Annex A
(normative)

Test report for verification of filter element fabrication integrity and determination of first bubble point

Date of test: _____ Operator: _____

Test liquid

Type: _____ Surface tension: _____ m·N/m

Temperature: _____ °C

Filter element

Manufacturer: _____

Manufacturer's identification number or part number: _____

Batch number/date code: _____

Used/Unused: _____

Comment: _____

Fabrication integrity

Appearance of a continuous stream of bubbles: ☐ YES ☐ NO

If yes, location of continuous stream of bubbles: ☐ filter material ☐ side seam ☐ end cap

at the pressure of _____ kPa (_____ mbar), as specified by the manufacturer.

First bubble point

Pressure measured when the first single continuous stream of bubbles appears:

Reading	**Pressure**		**Location of bubbles**	**Comment**
First reading:	kPa	mbar	☐ filter material ☐ end cap ☐ side seam	
Second reading:	kPa	mbar	☐ filter material ☐ end cap ☐ side seam	
Third reading:	kPa	mbar	☐ filter material ☐ end cap ☐ side seam	

Bibliography

[1] ISO 1219-1[1)], *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols for conventional use and data-processing applications*

1) To be published. (Revision of ISO 1219-1:1991)

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